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The 2002 Stream Water Quality Report is produced by the Division of Environmental Health of the Fairfax County Health Department.

Staff support is provided by the Division's Monitoring and Environmental Services staff, who collected, compiled and interpreted the stream sampling results for the year.

This and prior years reports are available on Fairfax County's Internet site at:

http://www.fairfaxcounty.gov/service/hd/strannualrpt.htm

Streams on the cover are from the Accotink and Pope's Head Watershed. Environmental Health Technician samples the stream with the HydroProbe.

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Fairfax County Health Department
Stream Water Quality Report

2002 Stream Water Quality Report

Abstract

The 2002 Stream Water Quality Report includes data collected from 84 sampling sites throughout 25 of 30 watersheds in Fairfax County. These sampling sites are representative of all the streams monitored within these watersheds. A total of 1,434 stream visits were made for collecting stream samples in 2002. The data in this report shows fluctuations in the stream water quality for individual sampling sites. The overall water quality of the watershed is considered fair for fecal coliforms and good for chemical and physical parameters.

A new data system for entry of stream sample results was initiated by the Health Department Laboratory in 2001.

The Health Department in 2002 investigated seven complaints concerning water quality.

Sampling Result Highlights

- 1,434 stream samples collected from 84 Sites.
- The stream samples in the good water quality range (<200 f.c./100 ml) for fecal coliform is 17% for 2002.
- Total phosphate, nitrate nitrogen, dissolved oxygen and pH levels remain consistent with the 5-year averages.

FIVE YEAR COMPARISON SUMMARY (1998 - 2002)*

FECAL COLIFORM (F.C./100ML)	1998	1999	2000	2001	2002
% Fecal Coliform <200 f.c./100ml	9	13	14	15	17
Fecal Coliform Mean**	689	758	544	569	510

PHYSICAL PARAMETERS	1998	1999	2000	2001	2002
Rainfall (Sum in inches)	39	41	38	36	37
Sample Temperature (°F)***	57	55	54	55	54

CHEMICAL PARAMETERS	1998	1999	2000	2001	2002
Total Phosphorus (mg/l)**	0.11	0.10	0.10	0.10	0.10
Nitrate Nitrogen (mg/l)**	0.61	0.65	0.60	0.60	0.50
Dissolved Oxygen (mg/l)**	8.9	11.3	9.2	8.6	7.8
pH**	7.2	7.3	7.1	7.2	7.1

*** Calculations based on all samples collected for each year**
**** Results for five year comparisons are calculated as a Geometric Mean.**
***** Arithmetic Mean**

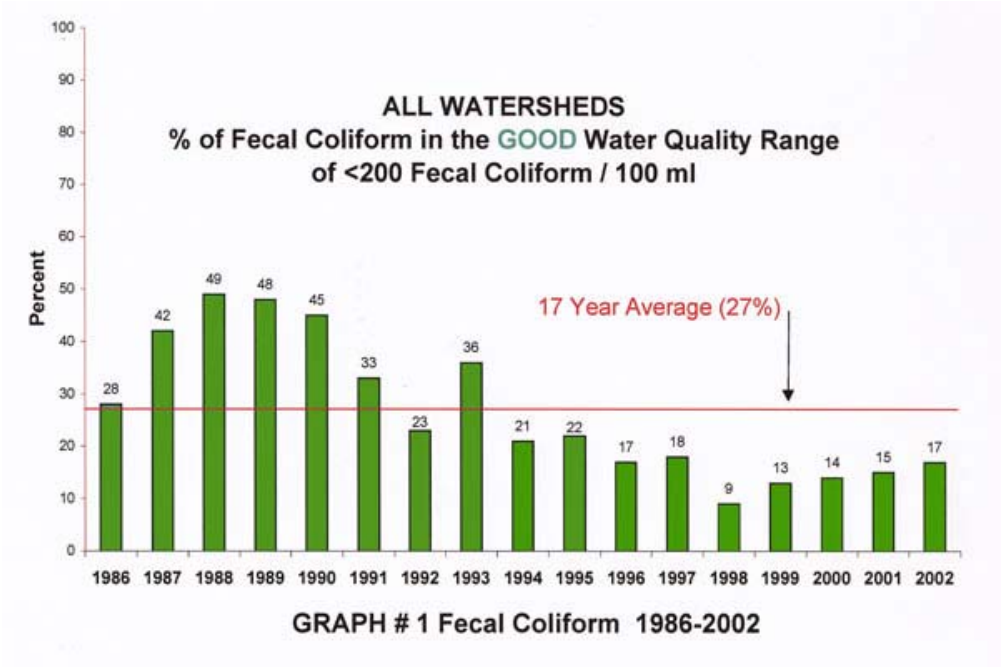
SECTION 1
2002 SURVEY RESULTS

I. Fecal Coliform

Criteria: ***Water quality standards include fecal coliform bacteria standards. These "indicator organisms", while not necessarily harmful in themselves, are found in the intestinal tracts of warm-blooded animals, including humans, and therefore, can be indicative of fecal contamination and the possible presence of a pathogenic organism. In surface waters, the fecal coliform bacteria should not exceed 200 fecal coliform bacteria per 100 ml of water.***

Grab samples are collected by Health Department personnel and transported to the Fairfax County Laboratory where the samples are evaluated by the membrane filter method.

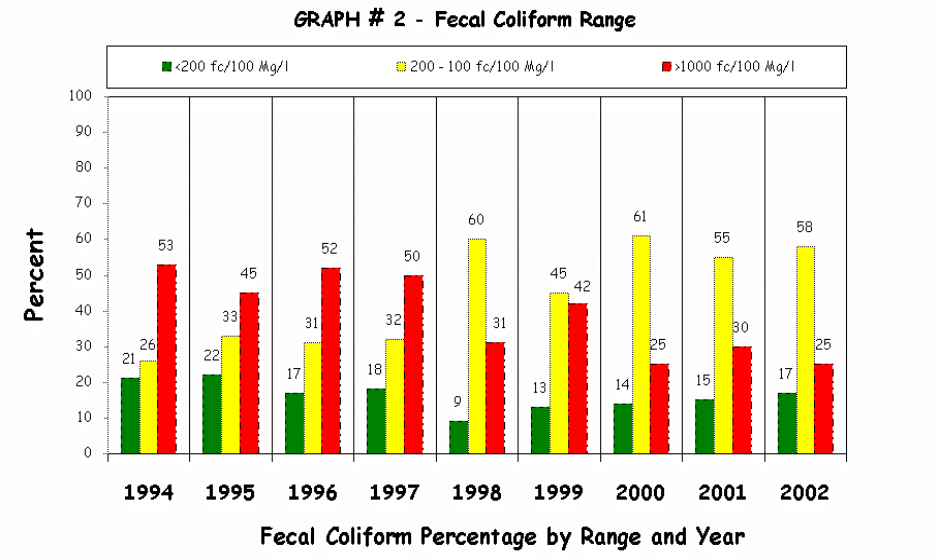
The fecal coliform bacteria standard is used to evaluate waters for all types of recreation. Prior to 1977, the coliform bacteria standards identified waters used for " secondary contact recreation ", e.g., - boating or fishing (200 - 1000/ 100 ml). In the 1977 amendments to Virginia's Water Quality Standards, the Department of Environmental Quality-Water (DEQW) adopted the more stringent bacteria standard for primary contact recreation to apply to all surface waters of the State. This action was taken as part of Virginia's commitment to attain the national goal of water quality suitable for all types of recreation.
NOTE: These standards will be changed in 2003.



GRAPH # 1 Fecal Coliform 1986-2002

The Department of Environmental Quality-Water (DEQW) has established a criteria for all surface waters, except shellfish waters, as follows "...the fecal coliform bacteria shall not exceed a geometric mean[1] of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a 30 day period, or a fecal coliform (f.c.) bacteria level of 1,000 per 100 ml at any time."[2] In 2002 the percentage of samples in the good water quality range (<200 f.c./100ml) increased to 17%, see Graph # 1.

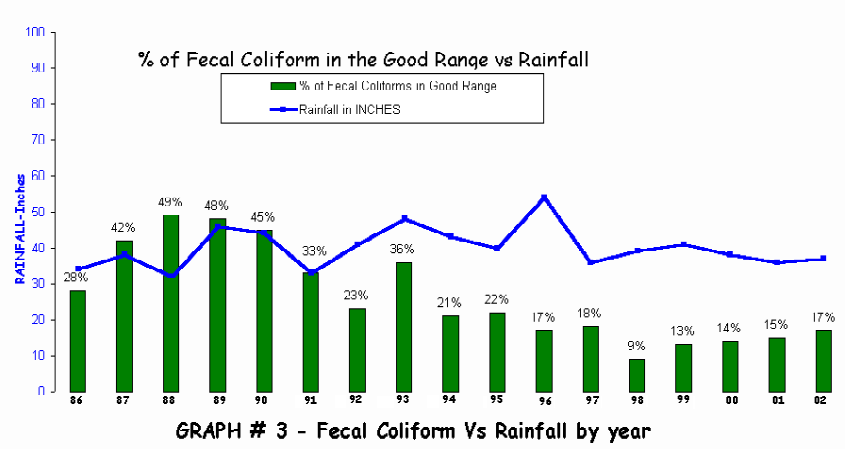
[1] ***The Geometric Mean is defined as the antilog of the average of the logarithms of the data values.***
[2] ***"Water Quality Standards "Commonwealth of Virginia State Water Control Board Regulations July 1,1988 page 19.***



A decrease in the number of samples in the > 1,000 f.c./100 ml was noted in 1998 (31%). In 1999 the number of samples in the > 1,000 f.c./100 ml range increased to 42% followed by a decrease to 25% in 2000 and 2002. Indicating a downward trend since 1997.

The movement of the number of samples within the >1, 000 f.c./100 ml range may reflect a seasonal variation and may not be a significant indicator of improvement Graph # 2.

Factors affecting the increase or decrease in the amount of fecal coliform in stream waters include rainfall amounts and the sample water temperature. Both of these factors are noted in past years' reports as environmental conditions affecting the fecal coliform results.



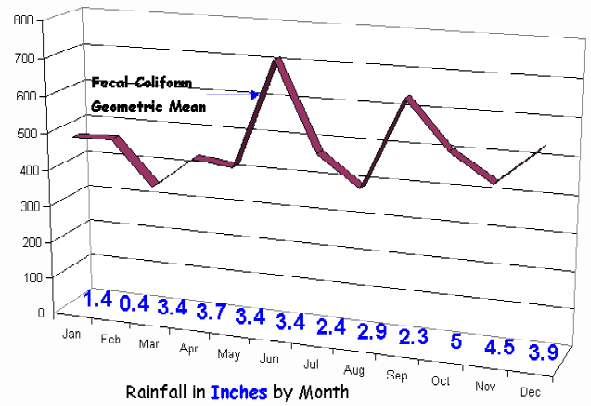
The first, increased rainfall, <u>may</u> affect fecal coliforms through dilution, allowing the streams to be more efficient in their self-cleansing action resulting in a decrease in the amount of fecal coliforms in the stream water. The normal action of the streams kills the majority of fecal coliform organisms introduced into them by oxidation and the lack of ideal habitat for the organisms. The fecal coliform organism is present in the fecal material of all warm-blooded animals and generally is deposited in the stream from rainfall events, which flush streets, lawns, gardens and woodlands. The average number of fecal coliform organisms discharged from the human body is about 400 billion per day. It is estimated that levels of 250,000 f.c./100 ml of water in streams are indicative of direct sewage discharge.

The assumption that an increase in rainfall would improve the water quality through self-cleansing of the streams by increased flow during the rainfall incidences has not been proven. A comparison of the percentage of fecal coliforms and the annual rainfall has not indicated a better water quality trend in this or past annual samplings. Several factors including sampling time (i.e. before or after significant rainfall), location of samples collected within the watershed (upper, middle or lower) and the general urbanization of the county make it difficult to see any self-cleansing action in the streams.

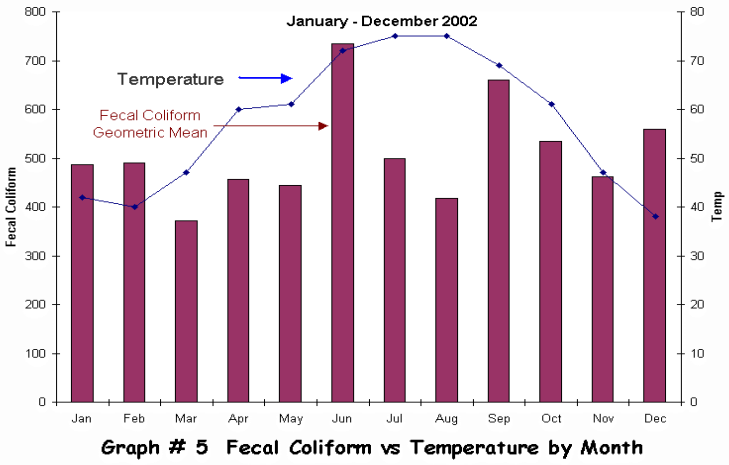
In 2002 the amount of rainfall was 37" (Graph #3). This did not reflect an appreciable increase or decrease in the good water quality levels for the year.

A further analysis of the rainfall by month in 2002 indicates a drought condition in Jan and Feb, but an increase in rainfall for the remainder of the year. Two spikes in the fecal coliform levels occurred during the highest rain months of April - June and October to December (Graph # 4).

Graph #4 Fecal Coliform Vs Rainfall by Month in 2002



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fecal Coliform	486	490	371	457	444	734	499	418	661	534	462	559
Rainfall	1.4	0.4	3.4	3.7	3.4	3.4	2.4	2.9	2.3	5	4.5	3.9



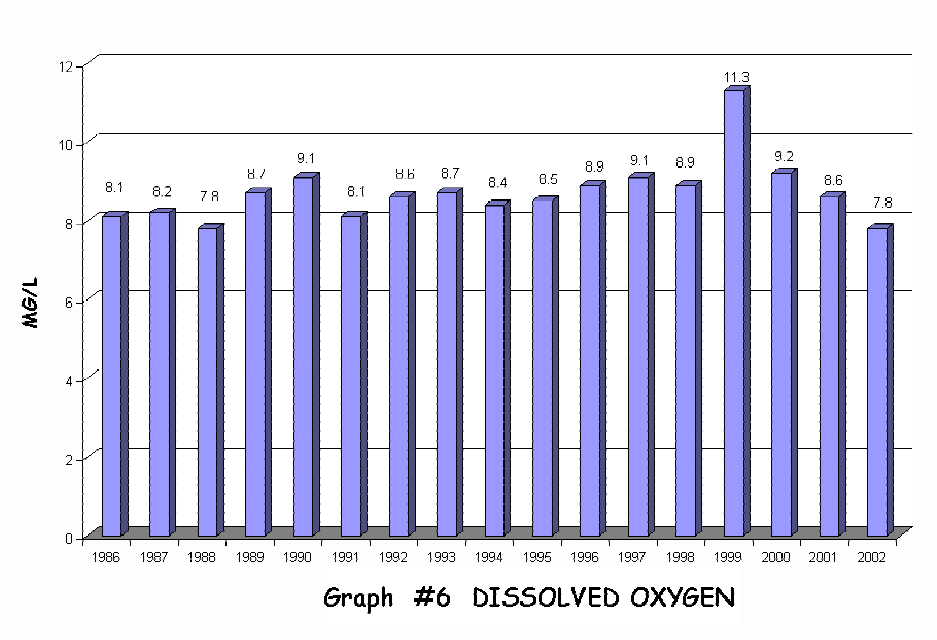
Graph # 5 Fecal Coliform vs Temperature by Month

The second factor, water temperature, may be contributing to an increase in the fecal coliform Geometric Mean by providing optimum temperatures for coliform growth. The overall trend was an increase in fecal coliform during the summer months April through August (Graph #5).

II. Dissolved Oxygen

Criteria: ***The presence of dissolved oxygen (D.O.) in water is essential for aquatic life, and the type of aquatic community is dependent to a large extent on the concentration of dissolved oxygen present. Dissolved oxygen standards are established to ensure the growth and propagation of aquatic ecosystems. The minimum standard for dissolved oxygen is 4.0 mg/l.***

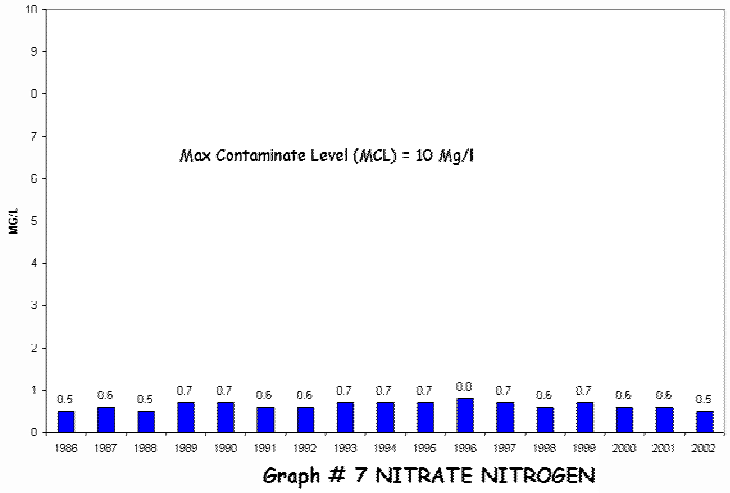
Ninety-Four percent (94%) of the samples collected for determination of dissolved oxygen (D.O.) were above 4.0 mg/l. The majority of the samples (54%) below 4.0 mg/l were recorded during the months of June (23 samples) and July (24 samples).
The summer water temperatures may be a contributing factor in the low DO levels. The average water temperature (74°F) for the summer months (June - August) were the highest for 2002



Graph #6 DISSOLVED OXYGEN

III. Nitrate Nitrogen

Criteria: ***Nitrate Nitrogen is usually the most prevalent form of nitrogen in water because it is the end product of the aerobic decomposition of organic nitrogen. Nitrate from natural sources is attributed to the oxidation of nitrogen in the air by bacteria and to the decomposition of organic material in the soil. Fertilizers may add nitrate directly to water resources. Nitrate concentrations can range from a few tenths to several hundred milligrams per liter. In nonpolluted water, they seldom exceed 10 mg/l. Nitrate is a major component of human and animal wastes, and abnormally high concentrations suggest pollution from these sources.***

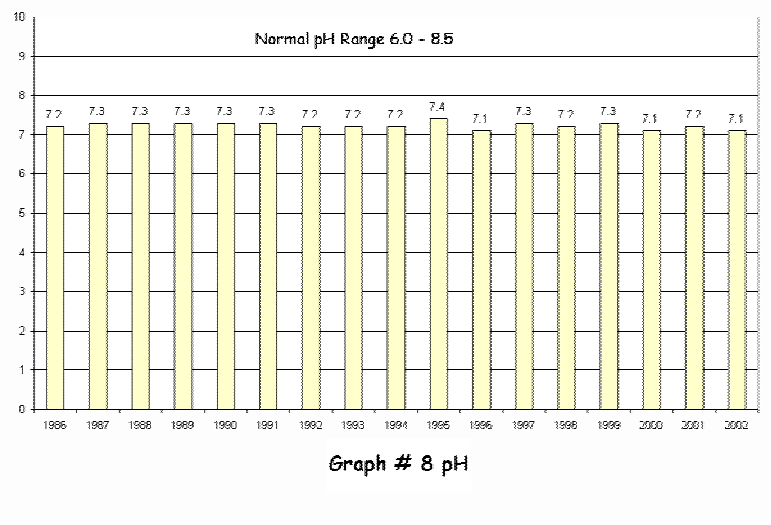


Graph # 7 NITRATE NITROGEN

The samples for nitrate nitrogen ranged from a low reading of 0.07 mg/l to a high of 13.5 mg/l. The overall nitrate nitrogen Geometric Mean was 0.5 mg/l. This is well below the maximum limit of 10 mg/l (Graph # 7). Four samples were above the maximum contaminate level of 10 mg/l. Station 25-04 in the Old Mill Branch Watershed accounted for 3 of the 4 samples over 10 mg/l and had the highest geometric mean for Nitrate Nitrogen (4.3 mg/l) of all samples collected in 2002 as indicated in Table 6. Station 25-04 ranged from the high of 13.5 mg/l in October to a low of 0.1 in March.

IV. PH

Criteria: ***Stream pH is an important factor in aquatic systems. Biological productivity, stream diversity, metal solubility, and toxicity of certain chemicals, as well as important chemical and biological activity, are strongly related to pH. The pH range of 6.0 - 8.5 generally provides adequate protection for aquatic life and for recreational use of streams.***



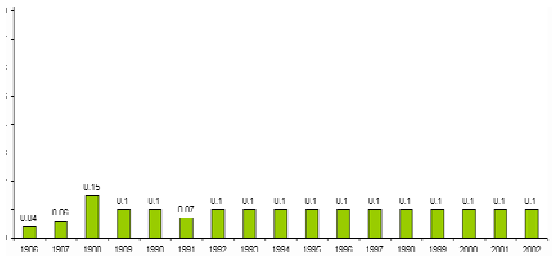
Graph # 8 pH

The average pH for all samples was 7.1 in 2002. The pH values ranged from a low reading of 5.0 to a high of 8.7 for all samples. Four samples were above the 8.5 limit and sixteen samples were below the 6.0 limit. Follow up testing indicated normal pH in sites that tested above and below pH range limits.

V. Phosphorus (Total)

Criteria: ***Phosphorus is found in natural water in the form of various types of phosphates. Organic phosphates are formed in the natural biological processes. Therefore, they are contributed to sewage in body wastes and food residues. They may also be formed in the biological treatment process or by life existing in the receiving water.***

Condensed phosphates and orthophosphates are found in treated wastewater, laundry detergents, commercial cleansing compounds and fertilizers. Phosphorus is essential to the growth of organisms and can be the nutrient that limits the growth which a body of water can support. When Phosphorus is a growth limiting nutrient, the discharge of raw or treated sewage, agricultural drainage or certain industrial wastes to receiving water may stimulate the growth, in nuisance quantities, of photosynthetic aquatic microorganisms and macroorganisms.

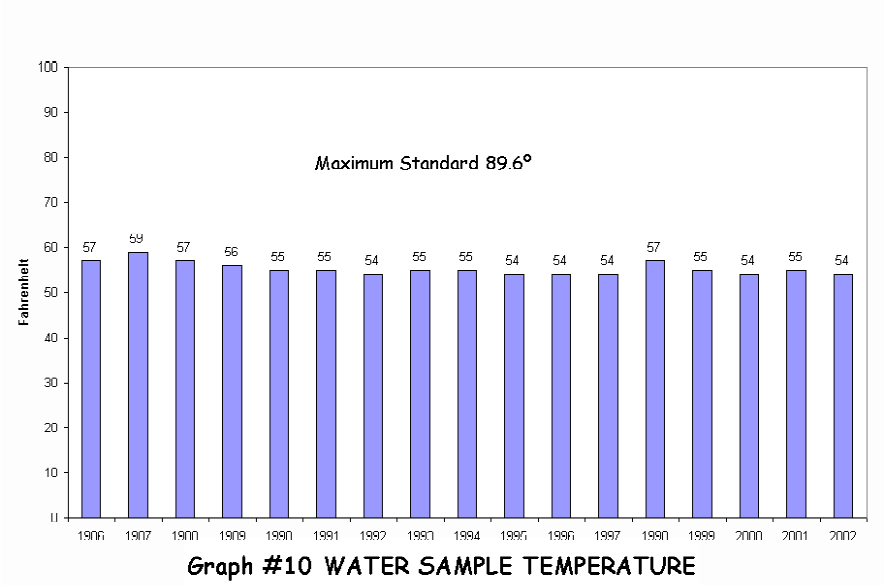


Graph # 9 TOTAL PHOSPHOROUS

There is no established limit for total Phosphorus content in stream water. Variations of the Phosphorus content may help determine possible trends of water contamination. Significant increases in total Phosphorus may indicate increasing amounts of contaminants entering the stream. This year's Geometric Mean of 0.10 mg/l does not indicate a significant increase over prior years' averages. Beginning in 1993, averages were a minimum of 0.10 mg/l due to a change in the Health Department Laboratory's testing procedure for total Phosphorus. The new automated testing procedure uses 0.10 mg/l as the lowest detection level rather than the 0.02 mg/l limit used prior to 1992. Phosphorus results for the past 17 years are illustrated in Graph # 9.

VI. Temperature

Criteria: ***The existence and composition of an aquatic community also depends greatly on the temperature characteristics of a body of water. Thus, temperature limits are included in water quality standards to protect and maintain a balanced aquatic community. The maximum standard for free flowing streams is 89.6°F (32°C).***



Graph #10 WATER SAMPLE TEMPERATURE

The temperature range for all stream water samples collected in 2002 was 28°F for the low in February and 89°F for the high in June. The average for all samples collected in 2002 was 54°F (Graph # 10).

VII. Heavy Metals

Criteria: ***The presence of heavy metals in stream water indicates possible discharge of household and industrial waste into the stream. Sampling establishes baseline data for identifying point source pollution from areas where urbanization of the stream area is or will be occurring.***

The following metals have been selected for sampling based on their occurrence in industrial and household waste discharge, their potential health hazards, and as part of the Virginia Department of Environmental Quality-Water requirements for Surface Water Standards for Surface Public Water Supplies (VR680-21-02.3).

Ten years (1989 -1998) of results are available in **Table 13** (page 36-42). All results are within normal limits.

KEY FOR METAL TESTING RESULTS

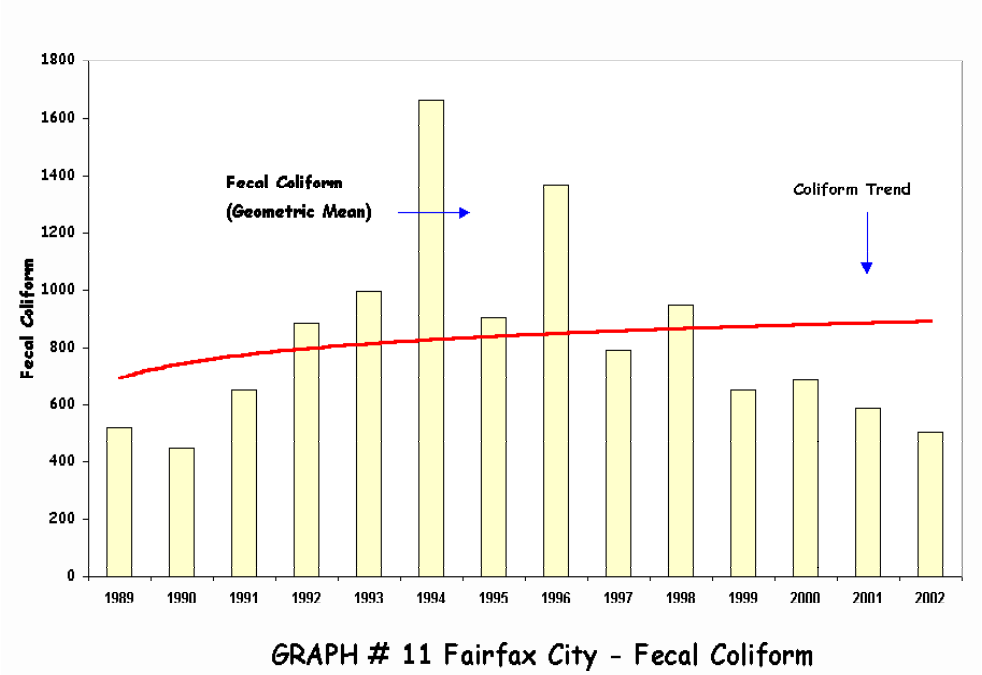
CONTAMINANT	PMCL : DETECTION LIMITS (MG/L)	SOURCE*	POTENTIAL HEALTH HAZARD*
ARSENIC	0.05 MG/L : 0.001 MG/L	Industrial / Household	Carcinogenic
BARIUM	1.00 MG/L : 0.03 MG/L	Industrial	Circulatory
CADMIUM	0.05 MG/L : 0.001 MG/L	Industrial Deterioration of Galvanized Pipe	Urinary
CHROMIUM	0.05 MG/L : 0.001 MG/L	Industrial	Arteriosclerosis
LEAD	0.05 MG/L : 0.002 MG/L	Industrial	Neurological
MERCURY	0.02 MG/L : 0.0002 MG/L	Industrial	Neurological
SELENIUM	0.01 MG/L : 0.003 MG/L	Industrial	Gastrointestinal
SILVER	0.05 MG/L : 0.001 MG/L	Industrial	Argyria
*Environmental Engineering & Sanitation 3rd Ed. by Joseph A. Salvato and Standard Methods for Examination of Water and Wastewater 16th Edition.			

VIII. Lake Accotink

Background: ***Lake Accotink is sampled from four surface points on the lake from May through August. The four sample points are surface grab samples and are only accessible by boat. It is necessary to coordinate the sampling schedule with the availability of a boat and operator, which is provided by the Fairfax Park Authority.***

Seven samples were collected from Lake Accotink in 2002. Results from the sampling were unremarkable and are summarized in Table 11.

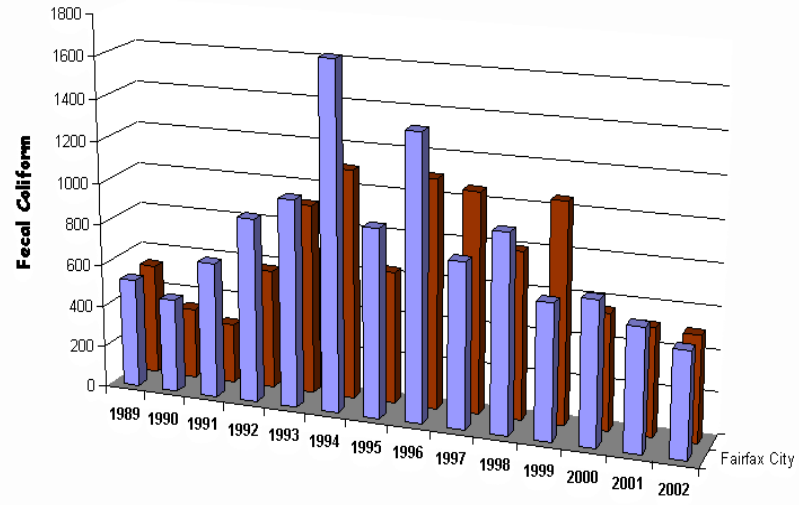
IX. Fairfax City Stream Sites (Accotink Watershed)



GRAPH # 11 Fairfax City - Fecal Coliform

Background: ***Stream sites are within a highly urbanized area and are subject to run-off from shopping centers, garages, parking lots, and other potentially high pollution areas. Storm drains feed the majority of the streams passing through the city and have been implicated, since sampling of the streams began in 1988, as sources of pollution from improperly disposed petroleum products. The streams within this area are part of the headwaters for the Accotink Watershed. Results of all samples collected for testing are located in*** TABLE 12.

Eighty-nine percent (89%) of the samples collected for fecal coliforms had results greater than or equal to 200 fecal coliforms/100 ml, while 11% of the samples collected are less than 200 fecal coliforms. The Geometric Mean for fecal coliforms from all Fairfax City stream sites decreased slightly over 2001 average of 588 fc/100ml to 506 fc/100 ml in 2002 (Graph #11).



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Fairfax City	523	448	649	886	997	1662	903	1367	792	950	649	686	588	506
Lower Accotink	532	339	286	575	915	1103	636	1101	1059	802	1054	560	516	507

GRAPH #12 Fairfax City Vs Accotink Watershed

The Fairfax City sample sites show the same general trend for fecal coliform as the other Accotink sampling sites. The samples for 2002 are the same as the lower Accotink sampling sites found outside of the Fairfax City limits (Graph #12).

The pH ranged from a low of 5.9 to a high of 7.7 in the 2002 sampling year. The Mean for pH for all city sites is 6.9 for 2002. Total Phosphorus levels ranged from a low of 0.1 mg/l to a high of 0.8 mg/l. Nitrate nitrogen ranged from a low of 0.07 mg/l to a high of 3.1 mg/l. The overall nitrate nitrogen average for all stream sites within Fairfax City is 0.38 mg/l. The dissolved oxygen results ranged between 1.3 mg/l for the low to 14.0 mg/l for the high, with 19 results less than 4 mg/l. The Dissolved Oxygen Geometric Mean for all sites in 2002 was 7.5 mg/l.

X. Water Quality Summary Statement

The 2002 Stream Water Quality Report includes data collected from 84 sampling sites from 25 of the 30 watersheds in Fairfax County. A total of 1,434 stream samples were collected for analyses in 2002. These sampling sites are representative of all the streams monitored within these watersheds. The data in this report shows fluctuations in the stream water quality for individual sampling sites. The average geometric mean for fecal coliform at several of the stream sample sites is approaching and surpasses 1000 f.c./100ml (see table 4). The chemical and physical parameters have remained constant over the past five years (see tables 7 -10). Therefore, the overall water quality of the watersheds in Fairfax County is considered fair for fecal coliform and good for the chemical and physical parameters of the streams.

In summary, any open, unprotected body of water is subject to pollution from indiscriminate dumping of litter and waste products, sewer line breaks and contamination from runoff pesticides, herbicides, and waste from domestic and wildlife animals. Therefore, the use of streams for contact recreational purposes, such as swimming, wading, etc., which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided.

SECTION 2
2002 WATER QUALITY PROGRAMS

I. Adopt-A-Stream Program

Background: ***The program was introduced at the Fairfax Fair in June 1989 in response to the Environmental Quality Advisory Council (EQAC) recommendations to promote citizen awareness to the potential hazards of recreational usage of streams and to provide the Health Department with citizen surveillance in the field of reporting possible pollution problems. An estimated 2000 people were provided information about the program through the display at the fair. Since 1989, the program has generated considerable interest in the private sector and citizens are responding on a regular basis. The program received national recognition when it was awarded the National Association of Counties 1991 Achievement Award and the Virginia Municipal League's 1991 award for Environmental Quality. A paper on the objectives and goals of the program was presented to the Virginia Water Resources Conference April 1992. Participants in the program range from individuals to Scout groups, civic organizations, public and private school science classes. Due to budget adjustments and staff reduction the program has been inactive for the past three years.***

2002 HIGHLIGHTS:

- The Annual Stream Report is being utilized in the County's Stream Protection Strategy.

- A two-year study with the United States Geological Survey (USGS) was initiated in 2000 to determine a method to "type" the fecal coliform found in streams. Results from this report were used as part of the USGS model.

- Ninety-five individuals and groups have participated in the program. These members represented over five hundred people involved in stream awareness and individual programs. The program has been inactive for the past two years due to staff reductions and increased workload of the Division of Environmental Health. Staff answers stream questions when requested by phone or mail.

- Environmental Health Specialists have presented One hundred (100) stream awareness programs to 1,938 county residents since the program began in 1989.

- The Fairfax County, Department of Public Works, Utilities Planning and Design Division has incorporated the Adopt-A-Stream program and the Annual Stream Water Quality Report into Part I of their National Pollutant Discharge Elimination System Permit Application (NPDES).

- The Department of Public Works identifies both the Stream Water Quality Report and the Adopt-A-Stream program as programs used by the County to help identify potential pollution sources.

II. Stream Complaints

Background: ***Procedures for investigation of stream complaints were standardized in 1989 to allow staff to respond in a minimum amount of time to potential point source pollution. The program was developed with the Adopt-A-Stream program as a central contact point for citizens to report stream problems. Since 1989 several of the complaints have resulted in court action, identification of underground spills and quicker departmental response to reported pollution problems.***

Nine (9) site visits were made to investigate 7 complaints in 2002. The 7 complaints were initially investigated by Health Department staff and referred to the proper agency or resolved utilizing Health Department procedures and local ordinances. Two complaints dealt with possible sewer line breaks, 2 were associated with fish kills, 2 were associated with illegal dumping and 1 dealt with a potential problem related to a broken sanitary sewer main line near a stream bed.

Section 3

Appendix A-Laboratory Procedures:

All laboratory procedures used in this report are defined in "Standard Methods for the Analysis of Water and Wastewater, 19th Edition", 1995. The fecal coliform procedure utilizes the Millipore filter and gives a direct count per 100 ml of sample. The nitrate nitrogen is determined by the automated cadmium reduction method and phosphates are determined by persulfate digestion followed by the ascorbic acid colorimetry. Heavy metal determination is made by electrothermal atomic absorption method using a graphite furnace. Mercury was analyzed by Cold Vapor Technique. Detection limits for heavy metals are located in a table found in Section I -VII of this report.

Beginning in 2000, a portable Hydrolab probe was utilized to collect the Dissolved Oxygen, pH and record the temperature of the samples taken in the field. The Hydrolab probe is standardized before each sampling event and the results recorded in a log before each use. The log is the quality assurance for the use of the probe and the results of the standardization is monitored for accuracy between use.

Appendix B-Watersheds and Sampling Sites

There are 30 watersheds within the County encompassing approximately 400 square miles. Sampling sites are established on 25 of these watersheds. Five watersheds are small and do not contain any well-defined streams; therefore, these are excluded from the program.

Sampling stations are located on the major streams and their main tributaries. The sample station identification number is a two-part number identifying the watershed and the sample

site. There are gaps in the sequential numbering system due to additions and elimination's of sample sites over several years.

The number of sampling sites in 2000 increased to 85. Eight sites within the Accotink Creek watershed were added in 1988 at the request of Fairfax City and 13 sites were added in 2000 for a total of 85. The Mill Branch sampling station (20-03) was dropped from the sampling schedule in 2001. The amount of available water to sample was determined to be insufficient for proper evaluation. The sampling site is located downstream from a debris landfill and is monitored by the Commonwealth of Virginia's Department of Environmental Quality- Waste. With the removal of sampling station 20-03, the current number of sampling sites is 84.

The reports for the Accotink Creek watershed include the stream sample results from the Fairfax City sites as well as the Accotink Creek sites in the County. Samples are collected twice a month using a combination of random grab samples and a portable probe.

The stream sample site locations have been evaluated for run-off potential and possible sources of pollution. The sites are located on tax maps and diagrams of the sites are available for reference. Directions to the sites were developed to standardize the sampling sites and for use in the field by Environmental Health Specialists.

Maps of sampling sites were developed using Fairfax County's Geographic Information System (GIS). The maps are part of Section 5 of this report and were generated by Health Department personnel using a GPS system and the County's ArcView program.

Appendix C-Data Tables and Calculations

Comparison and trends of the data are based on a five, ten and fifteen year periods. Data may be obtained for previous years from earlier reports. Data for years prior to 1973 are not comparable due to differentiation in laboratory methods and reporting techniques. The terms Geometric Mean and Average are defined as follows:

The geometric mean is defined as the antilog of the average of the logarithms of the data values. The term average is used as the Arithmetical Average of data values.

Fecal coliform results for each station are presented in Table 2. The data provides for a year comparison of sample stations to assist in recognizing trends in water quality. The percentage of samples based on their fecal coliform classification (<200 F.C./100 ml and equal to or >200 F.C./100 ml) for each of the watersheds is shown with comparison to previous years in Table 3. Table 4 gives the geometric mean value for each sampling station for fecal coliform organisms. The annual data for dissolved oxygen is presented in Table 5. The data for nitrate nitrogen, pH, and total Phosphorus is provided in Table 6. Tables 7 (nitrate nitrogen), 8 (pH) and 9 (total Phosphorus) compare a five-year period for each watershed. The average temperature, with the high and low temperature for each month, is found in Table 10. The Lake Accotink Data is presented in Table 11. A separate report for the Fairfax City stream sites is included in Table 12 and the sampling data for heavy metal screening is included in Table 13.

The calculations for this report are generated using dBase IV programming to provide the database and mathematical computations. Development of the computer database began in 1986 with the data stored by calendar year (January 1 to December 31) for report generation. Graphs were generated using Microsoft Office 97, Excel.

The Fairfax County Stream Sampling Sites maps were created as a GIS project using ArcView for Windows. As physical overlays of the County are developed, the GIS program will be developing more detailed maps of sampling sites.

Appendix D-Stream Water Quality Report Background

The Department of Health's Division of Environmental Health in the fall of 1969 initiated the Stream Water Quality Program. The primary objective of the program is to monitor the water quality of the streams in Fairfax County and obtain data for use in stream water quality surveillance. This enables the Environmental Services staff to locate pollution sources and to initiate corrective action or refer to the appropriate agency for corrective action. The data for this report was collected by the staff of the Environmental Services Section with supplemental information from the Environmental Monitoring Section "**2002 Annual Summary Report**" for the Fairfax County Board of Supervisors.

The parameters originally selected as criteria for stream water quality were fecal coliform and dissolved oxygen. The parameters were expanded in 1979 to include pH, nitrate nitrogen and total Phosphorus and in 1982, to include temperature criteria. A screening for heavy metals was collected from 1989 to 1998 to establish a background database for future evaluations. The criteria of each parameter used in this report are based on the Department of Environmental Quality-Water (DEQW) standards.

The 1994 report contained several enhancements to the programming and presentation formats. The format for Tables 1,3,4,10 and 11 was changed for better understanding and readability. All tables are now generated by dBase IV programming and do not require time to enter additional information for five-year comparison reports. The graphs are embedded files in the report, resulting in sharper graphic images.

The 1995 and 1996 reports contain enhancements using Fairfax County's GIS Pilot program and downloaded information and material from the Internet. Future enhancements will include a menu of utility programs for monthly, quarterly or semi-annual review of statistics.

Annual Stream reports from 1997 to the present are available for downloading from the Health Department's web site (http://www.fairfaxcounty.gov/service/strannualrpt.htm). The reports are available in Acrobat PDF file format and the chemical and fecal coliform results from 1986 to the present are available in dBase IV format.

In 2000, thirteen (13) additional sampling sites were added to the survey and GIS maps for each watershed with sampling sites were made for inclusion in the Annual Report. The GIS overlay for the location of the stream sampling sites were created in house using Health Department GPS equipment.

We welcome comments, suggestions and clarifications. However, the **Stream Water Quality Report** is a **trend** analysis report and general findings should not be applied to specific sampling sites. Samples are grab samples collected twice a month, when possible, with many factors influencing any particular sample. Results should be viewed in perspective to all sampling sites within the watershed as well as all sampling sites within the county.

The **Stream Water Quality Report** is provided to the Fairfax County Board of Supervisors, the Metropolitan Washington Council of Governments, Northern Virginia Soil and Water Conservation District, Northern Virginia Planning District Commission, Fairfax County Park Authority, Fairfax City Office of City Planning, Prince William Water and Conservation Division and any Fairfax County citizens group or individual requesting the report. Request for additional copies of the **Stream Water Quality Report** may be directed to the mailing address found in the Table of Contents.

SECTION - 4
DATA TABLES

TABLE 1

Number of stream visits made for collection of stream samples 1993 - 2002

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1692	1528	1574	1536	1686	1520	1486	1277	1656	1434

NUMBER OF SAMPLES COLLECTED BY TYPE OF SAMPLE FOR 2002

FECAL COLIFORM	1274
DISSOLVED OXYGEN	1356
NITRATE NITROGEN	1387
TOTAL PHOSPHORUS	1424
PH	1381

TABLE 2

NUMBER OF FECAL COLIFORM SAMPLES FOR EACH SAMPLING SITE

REPORT FROM 01/01/2002 TO 12/31/2002

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 /100 ml	200-1000 /100 ml	>1000 /100ml
HORSEPEN CREEK				
01-01	13	1	7	5
SUGARLAND RUN				
02-02	15	4	8	3
02-03	15	1	8	6
NICHOL RUN				
03-03	12	1	7	4
POND BRANCH				
04-01	16	1	13	2
04-02	16	3	10	3
04-03	16	2	9	5
DIFFICULT RUN				
05-01	15	2	9	4
05-05	13	4	6	3
05-09	13	3	7	3
05-11	13	2	7	4
05-12	13	4	6	3
05-13	13	5	6	2
05-15	15	2	7	6
05-16	17	1	13	3
05-18	13	2	5	6
05-19	13	4	3	6
BULLNECK RUN				
06-02	15	3	9	3
SCOTTS RUN				
07-01	15	6	7	2
DEAD RUN				
08-02	15	2	12	1
TURKEY RUN				
09-01	15	3	8	4

TABLE 2

NUMBER OF FECAL COLIFORM SAMPLES FOR EACH SAMPLING SITE

REPORT FROM 01/01/2002 TO: 12/31/2002

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 /100 ml	200-1000 /100 ml	>1000 /100 ml
PIMMIT RUN				
10-02	15	3	9	3
10-03	15	2	9	4
10-04	15	3	8	4
10-05	15	0	13	2
FOUR MILE RUN				
11-03	13	4	7	2
CAMERON RUN				
12-04	12	3	7	2
12-05	12	1	6	5
12-07	13	2	10	1
12-12	18	3	11	4
12-13	16	2	8	6
12-14	18	3	12	3
LITTLE HUNTING CREEK				
14-02	13	1	9	3
14-03	18	2	11	5
DOGUE CREEK				
15-06	18	1	12	5
ACCOTINK CREEK				
16-03	13	2	8	3
16-07	13	2	9	2
16-08	13	2	8	3
16-09	13	2	8	3
16-12	18	2	9	7
POHICK CREEK				
17-04	16	4	8	4
17-05	16	2	11	3
17-06	16	3	8	5
17-08	15	3	6	6
17-13	18	5	9	4

TABLE 2

NUMBER OF FECAL COLIFORM SAMPLES FOR EACH SAMPLING SITE

REPORT FROM: 01/01/2002 TO 12/31/2002

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 /100 ml	200-1000 /100 ml	>1000 /100ml
MILL BRANCH				
20-01	16	3	10	3
20-02	16	6	10	0
SANDY RUN				
22-03	12	2	8	2
22-04	15	3	5	7
WOLF RUN				
24-01	16	4	8	4
24-02	18	3	9	6
OLD MILL BRANCH				
25-04	18	3	13	2
POPES HEAD CREEK				
26-02	18	0	14	4
26-03	18	1	12	5
26-05	18	4	8	6
JOHNNY MOORE CREEK				
27-01	15	2	9	4
LITTLE ROCKY RUN				
28-01	16	5	5	6
28-02	18	3	7	8
CUB RUN				
29-02	15	3	10	2
29-03	16	5	7	4
29-04	16	4	10	2
29-05	16	6	5	5
29-06	17	3	12	2
29-08	14	3	6	5
BULL RUN				
30-01	16	2	6	8

TABLE 3
Five Year Comparison of Stream Water Quality Data
by Percentage of Samples in tile Good Range For Fecal Coliforms
(Less than 200 f.c. per 100 mg/1)

Five Year Survey From 1998 To 2002

WATERSHED	YEAR				
	1998	1999	2000	2001	2002
HORSEPEN CREEK-01	6	5	11	15	8
SUGARLAND RUN-02	12	14	13	17	16
NICHOL RUN-03	8	0	14	13	15
POND BRANCH-04	13	10	14	20	13
DIFFICULT RUN-05	9	6	16	14	21
BULLNECK RUN-06	8	24	25	16	20
SCOTTS RUN-07	4	14	13	11	40
DEAD RUN-08	4	5	6	11	13
TURKEY RUN-09	8	29	25	11	20
PIMMIT RUN-10	3	10	11	10	13
FOUR MILE RUN-11	4	5	5	14	31
CAMERON RUN-12	5	15	12	21	15
LITTLE HUNTING-14	5	17	19	16	10
DOGUE CREEK-15	18	5	13	11	6
ACCOTINK CREEK-16	7	13	10	18	12
POHICK CREEK-17	7	12	13	19	21
MILL BRANCH-20	4	30	6	21	28
SANDY RUN-22	7	19	4	16	19
WOLF RUN-24	10	13	9	19	21
OLD MILL-25	11	17	17	14	17
POPES HEAD-26	13	13	13	14	9
JOHNNY MOORE-27	21	16	13	19	13
LITTLE ROCKY-28	17	8	23	16	24
CUB RUN-29	15	13	26	10	24
BULL RUN-30	30	9	35	14	13

Table 4
Geometric Mean of Fecal Coliforms
Per 100/ml by Supervisor Districts

Five Year Survey From 1998 To 2002

District/ Station Number	Stream Name	Collection point	Year Collected				
			1998	1999	2000	2001	2002
BRADDOCK							
16-07	Long Branch	Braddock Rd	695	1472	657	688	390
16-08	Accotink Ck	Braddock Rd	1006	991	604	556	430
DRANESVILLE							
02-02	Folly Lick Br	Hiddenbrook	665	642	547	565	440
02-03	Sugarland Run	Rt 7	804	545	478	485	794
03-03	Jefferson Br	Springvale Rd	629	725	814	530	651
04-01	Mine Run Br	River Bend Rd	478	833	545	544	655
04-02	Clarks Branch	Beach Mill Rd	662	562	541	458	538
04-03	Pond Branch	Blackberry La	501	580	469	544	596
05-15	Capt Hickory Br	Fringe Tree Rd	563	808	500	518	632
05-19	Wolf Trap Run	Trap Rd	795	1032	524	755	558
06-02	Bull Neck Run	Georgetown Pk	487	616	491	543	466
07-01	Scott Run	Georgetown Pk	605	807	512	696	328
08-02	Dead Run	Whann St	949	1146	664	641	462
09-01	Turkey Run	George Wash Pk	529	491	491	562	409
10-02	Pimmit Run	Old Dominion	741	817	515	682	573
10-03	Pimmit Run	Kirby Rd	826	1295	786	547	470
10-04	Little Pimmit	Kirby Rd	835	739	603	516	418
10-05	Pimmit Run	Westmoreland	768	730	364	612	715
HUNTER MILL							
01-01	Horsepen Run	Centreville Rd	584	939	432	512	762
05-09	Difficult Run	Hunter Mill Rd	821	935	486	558	423
05-11	Wolf Trap Run	Browns Mill Rd	725	779	459	488	573
05-12	Difficult Run	Browns Mill Rd	871	1433	498	558	363
05-13	Colvin Mill Run	Rt 7	733	914	629	535	349
05-18	Wolf Trap Cr	Lois Ave	639	1400	657	615	661
LEE							
12-14	Pikes Branch	Telegraph Rd	552	742	413	441	498
16-09	Accotink Ck	Old Keen Mill	677	941	640	471	517
MASON							
11-03	Long Branch	Glen Carlyn Rd	846	1605	606	699	310
12-04	Tripps Run	Sleepy Hollow	790	918	584	368	437
12-05	Holmes Run	Sleepy Hollow	930	998	730	463	625
12-07	Holmes Run	Glen Hills Pk	661	790	565	549	353
12-12	Turkey Cock	Edsall Rd	496	623	419	502	465
MT VERNON							
12-13	Cameron Run	Fenwick Drive	671	784	660	611	657
14-02	Lit Hunting Ck	Richmond Hwy	939	724	426	645	437

Table 4
Geometric Mean of Fecal Coliforms
Per 100/ml by Supervisor Districts

Five Year Survey From 1998 To 2002

District/ Station Number	Stream Name	Collection point	Year Collected				
			1998	1999	2000	2001	2002
MT VERNON							
14-03	Lit Hunting Ck	Richmond Hwy	877	944	574	672	555
16-12	Long Branch	Baer-lick Rd	702	905	332	390	704
17-06	Pohick Creek	Pohick Rd	702	529	590	482	505
17-08	Pohick Creek	Old Colchester	582	897	629	494	539
20-01	Giles Run	Lorton Rd	805	687	648	522	442
20-02	Giles Run	Old Colchester	755	440	657	426	263
PROVIDENCE							
16-03	Accotink Creek	Barclay Dr	990	1055	593	499	486
SPRINGFIELD							
17-04	Pohick Creek	Old Keene Mill	601	853	498	618	378
17-05	South Run	Lee Chapel Rd	484	763	670	491	531
17-13	Pohick Creek	Burke Lake Rd	926	1325	410	510	430
22-03	Sandy Run	Henderson Rd	861	735	551	725	353
22-04	Sandy Run	Cathedral Forest	702	690	718	631	533
24-01	Wolf Run	Clifton Rd	566	579	775	354	458
24-02	Wolf Run	Henderson Rd	602	586	520	509	588
25-04	Bull Run	Old Yates Ford	565	591	560	777	500
26-02	Popes Head Ck	Popes Head Rd	562	600	532	451	559
26-03	Piney Branch	Popes Head Rd	554	534	530	695	716
26-05	Popes Head Ck	Clifton Creek	699	919	625	706	534
27-01	Johnny Moore Ck	Compton Rd	514	507	551	582	615
28-02	Little Rocky Run	Compton Rd	631	832	545	536	676
SULLY							
05-01	Difficult Run	Waples Mill &Fox Mill rd	464	981	472	745	530
05-05	Difficult Run	Vale Rd	766	1111	594	478	476
28-01	Little Rocky Run	Lee Hwy	506	869	328	695	535
29-02	Big Rocky Run	Braddock Rd	511	421	348	660	478
29-03	Cub Run	Braddock Rd	626	646	528	679	379
29-04	Cub Run	Compton Rd	484	458	349	695	439
29-05	Flatlick Branch	Lee Jackson Rd	981	670	372	699	455
29-06	Flatlick Branch	Braddock Rd	577	692	374	628	440
29-08	Cub Run	Braddock Rd	500	446	390	679	568
30-01	Bull Run	Lee Hwy	419	698	339	676	747

TABLE 5

DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/2002 TO: 12/31/2002

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
HORSEPEN CREEK			
01-01	14	8.4	0
SUGARLAND RUN			
02-02	18	9.7	0
02-03	18	9.4	0
NICHOL RUN			
03-03	14	8.9	0
POND BRANCH			
04-01	18	9.4	0
04-02	18	8.5	0
04-03	18	9.1	0
DIFFICULT RUN			
05-01	16	10.0	0
05-05	14	8.4	0
05-09	13	7.8	0
05-11	14	9.1	0
05-12	14	7.6	0
05-13	14	8.9	0
05-15	18	9.7	0
05-18	14	8.4	0
05-19	14	9.2	0
BULLNECK RUN			
06-02	12	10.1	0
SCOTTS RUN			
07-01	14	9.2	0
DEAD RUN			
08-02	14	8.8	0
TURKEY RUN			
09-01	14	10.4	0

TABLE 5

DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/2002 TO: 12/31/2002

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
PIMMIT RUN			
10-02	13	7.9	7.7
10-03	14	8.8	7.1
10-04	14	9.3	0
10-05	14	10.0	0
FOUR MILE RUN			
11-03	15	8.4	0
CAMERON RUN			
12-04	14	7.5	14.3
12-05	14	7.7	0
12-07	15	8.2	0
12-12	21	9.1	0
12-13	21	6.9	23.8
12-14	21	8.4	0
LITTLE HUNTING CREEK			
14-02	16	6.5	6.3
14-03	20	7.0	20.0
DOGUE CREEK			
15-06	21	6.7	28.6
ACCOTINK CREEK			
16-03	15	5.8	40.0
16-07	15	6.5	33.3
16-08	15	6.5	33.3
16-09	15	6.5	20.0
16-12	21	9.1	0
POHICK CREEK			
17-04	16	9.6	0
17-05	16	8.5	12.5
17-06	16	10.0	0
17-08	16	8.5	0
17-13	20	8.5	1.0

TABLE 5

DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/2002 TO: 12/31/2002

TOTAL SAMPLE STATION	AVERAGE SAMPLES COLLECTED	DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
MILL BRANCH			
20-01	16	9.1	0
20-02	16	8.2	6.3
SANDY RUN			
22-03	13	9.7	0
22-04	14	9.4	0
WOLF RUN			
24-01	16	8.9	0
24-02	19	9.0	21.1
OLD MILL BRANCH			
25-04	19	7.3	10.5
POPES HEAD CREEK			
26-02	20	9.5	5
26-03	20	9.9	0
26-05	19	9.3	5.3
JOHNNY MOORE CREEK			
27-01	16	8.9	0
LITTLE ROCKY RUN			
28-01	16	6.9	18.8
28-02	20	9.4	0
CUB RUN			
29-02	15	8.5	0
29-03	16	8.7	6.3
29-04	16	9.2	0
29-05	16	8.6	0
29-06	16	8.1	0
29-08	16	8.9	0
BULL RUN			
30-01	16	8.9	0

TABLE 6

AVERAGES FOR NITRATE NITROGEN (mg/l)
PH VALUES AND TOTAL PHOSPHORUS (mg/l)

REPORT FROM: 01/01/2002 TO: 12/31/2002

SAMPLE STATION	AVERAGE NITRATE NITROGEN	AVERAGE PH	AVERAGE TOTAL PHOSPHORUS
HORSEPEN CREEK			
01-01	1.5	7.2	0.1
SUGARLAND RUN			
02-02	1.3	7.5	0.1
02-03	0.9	7.4	0.1
NICHOL RUN			
03-03	0.6	7.0	0.1
POND BRANCH			
04-01	0.8	6.9	0.1
04-02	1.4	6.9	0.1
04-03	1.5	7.0	0.1
DIFFICULT RUN			
05-01	0.7	6.9	0.1
05-05	0.8	6.7	0.1
05-09	0.7	6.7	0.1
05-11	1.2	7.0	0.1
05-12	0.7	6.8	0.1
05-13	1.1	7.0	0.1
05-15	1.6	6.6	0.1
05-18	0.7	7.1	0.1
05-19	0.9	7.1	0.1
BULLNECK RUN			
06-02	2.1	7.0	0.1
SCOTTS RUN			
07-01	0.9	7.1	0.1
DEAD RUN			
08-02	1.5	7.0	0.1
TURKEY RUN			
09-01	1.0	7.5	0.1

TABLE 6

AVERAGES FOR NITRATE NITROGEN (mg/l)
PH VALUES AND TOTAL PHOSPHORUS (mg/l)

REPORT FROM: 01/01/2002 TO 12/31/2002

SAMPLE STATION	AVERAGE NITRATE NITROGEN	AVERAGE PH	AVERAGE TOTAL PHOSPHORUS
PIMMIT RUN			
10-02	0.9	7.2	0.1
10-03	0.9	7.4	0.1
10-04	1.2	7.4	0.1
10-05	0.8	7.6	0.1
FOUR MILE RUN			
11-03	0.6	7.2	0.1
CAMERON RUN			
12-04	1.0	7.0	0.1
12-05	0.5	7.2	0.1
12-07	0.6	7.0	0.1
12-12	0.5	6.8	0.1
12-13	0.4	6.8	0.1
12-14	0.6	7.1	0.1
LITTLE HUNTING CREEK			
14-02	0.8	6.9	0.2
14-03	0.8	6.8	0.1
DOGUE CREEK			
15-06	0.2	6.7	0.1
ACCOTINK CREEK			
16-03	0.4	6.5	0.1
16-07	0.3	6.8	0.1
16-08	0.3	6.9	0.1
16-09	0.5	6.9	0.1
16-12	0.4	6.8	0.1
POHICK CREEK			
17-04	0.3	7.1	0.1
17-05	0.2	6.5	0.1
17-06	0.3	7.3	0.1
17-08	1.1	7.0	0.1
17-13	0.4	6.5	0.1

TABLE 6

AVERAGES FOR NITRATE NITROGEN (mg/l)
PH VALUES AND TOTAL PHOSPHORUS (mg/l)

REPORT FROM: 01/01/2002 TO 12/31/2002

SAMPLE STATION	AVERAGE NITRATE NITROGEN	AVERAGE PH	AVERAGE TOTAL PHOSPHORUS
MILL BRANCH			
20-01	0.7	7.1	0.1
20-02	0.6	6.9	0.1
SANDY RUN			
22-03	0.3	6.6	0.1
22-04	0.2	6.9	0.1
WOLF RUN			
24-01	0.2	6.9	0.1
24-02	0.3	6.8	0.1
OLD MILL BRANCH			
25-04	4.3	7.1	0.1
POPES HEAD CREEK			
26-02	0.9	7.4	0.1
26-03	0.7	7.5	0.1
26-05	0.5	7.1	0.1
JOHNNY MOORE CREEK			
27-01	0.6	7.2	0.1
LITTLE ROCKY RUN			
28-01	0.7	7.4	0.1
28-02	0.7	7.4	0.1
CUB RUN			
29-02	0.6	7.5	0.1
29-03	0.8	7.6	0.1
29-04	0.8	7.8	0.1
29-05	1.2	6.9	0.1
29-06	0.8	7.4	0.1
29-08	0.9	7.6	0.1
BULL RUN			
30-01	0.4	7.5	0.1

Table 7
Geometric Mean of Nitrate Nitrogen
by Watershed

Five Year Survey From 1998 To 2002

Watershed	1998	1999	2000	2001	2002
01-Horsepen Creek	1.2	1.4	0.8	1.1	1.0
02-Sugar land Run	0.9	1.1	0.6	0.9	0.7
03-Nichol Run	1.0	0.4	0.6	0.8	0.6
04-Pond Branch	1.5	1.4	0.8	1.2	1.0
05-Difficult Run	1.1	0.9	0.7	1.0	0.8
06-Bullneck Run	1.7	2.2	2.0	2.3	1.7
07-Scotts Run	1.1	1.0	0.9	0.7	0.8
08-Dead Run	1.6	1.8	1.5	1.7	1.3
09-Turkey Run	1.1	1.1	1.0	1.2	0.9
10-Pimmit Run	1.2	1.1	1.0	1.1	0.7
11-Four Mile Run	1.3	0.9	1.3	0.8	0.4
12-Cameron Run	0.7	0.8	0.5	0.5	0.4
14-Little Hunting Creek	0.7	0.7	0.4	0.6	0.5
15-Douge Creek	0.2	0.2	0.1	0.2	0.2
16-Accotink Creek	0.5	0.6	0.5	0.5	0.4
17-Pohick creek	0.3	0.3	0.3	0.3	0.3
20-Mill Branch	0.3	0.4	0.7	0.6	0.5
22-Sandy Run	0.2	0.3	0.2	0.2	0.2
24-Wolf Run	0.2	0.2	0.2	0.2	0.2
25-Old mill Branch	3.5	3.7	5.4	1.8	2.2
26-Popes Head Creek	0.8	0.7	0.9	0.7	0.5
27-Johnny Moore Creek	0.4	0.5	0.6	0.4	0.4
28-Little Rocky Run	0.3	0.3	0.3	0.3	0.5
29-Cub Run	0.4	0.7	0.6	0.5	0.6
30-Bull Run	0.2	0.3	0.2	0.2	0.2

Table 8
Geometric Mean of pH
by Watershed

Five Year Survey From 1998 To 2002

Watershed	1998	1999	2000	2001	2002
01-Horsepen Creek	7.4	7.3	7.2	7.4	7.1
02-Sugarland Run	7.5	7.5	7.4	7.6	7.6
03-Nichol Run	7.1	7.2	7.1	7.2	7.0
04-Pond Branch	7.1	7.1	6.9	7.0	6.9
05-Difficult Run	7.1	7.1	6.9	7.0	6.8
06-Bullneck Run	7.3	7.3	7.3	7.0	6.9
07-Scotts Run	7.5	7.7	7.7	7.1	7.1
08-Dead Run	7.0	7.2	7.1	7.0	7.0
09-Turkey Run	7.7	7.7	7.6	7.5	7.5
10-Pimmit Run	7.6	7.6	7.7	7.4	7.4
11-Four Mile Run	7.1	7.4	6.8	7.1	7.2
12-Cameron Run	7.2	7.3	7.0	7.2	6.9
14-Little Hunting Creek	6.8	6.9	6.8	7.0	6.9
15-Douge Creek	6.9	6.9	6.8	7.0	6.7
16-Accotink Creek	7.2	7.3	7.0	7.0	6.9
17-Pohick Creek	7.1	7.2	6.9	6.9	6.8
20-Mill Branch	7.2	7.3	7.1	7.0	7.0
22-Sandy Run	7.1	7.2	7.2	6.9	6.8
24-Wolf Run	7.2	7.2	7.0	7.0	6.9
25-Old Mill Branch	7.6	7.5	7.4	7.3	7.0
26-Popes Head Creek	7.4	7.4	7.4	7.5	7.3
27-Johnny Moore Creek	7.1	7.2	7.2	7.3	7.2
28-Little Rocky Run	7.5	7.4	7.4	7.4	7.4
29-Cub Run	7.5	7.6	7.3	7.5	7.5
30-Bull Run	7.3	7.4	7.4	7.6	7.5

Table 9
Geometric Mean of Total Phosphorus (mg/l) by watershed
Five Year Survey From 1998 To 2002

	Year Collected				
Watershed	1998	1999	2000	2001	2002
01-Horsepen Creek	0.11	0.11	0.13	0.10	0.10
02-Sugarland Run	0.11	0.10	0.12	0.10	0.10
03-Nichol Run	0.10	0.10	0.10	0.09	0.10
04-Pond Branch	0.10	0.10	0.11	0.09	0.10
05-Difficult Run	0.10	0.10	0.10	0.09	0.09
06-Bullneck Run	0.10	0.10	0.12	0.09	0.09
07-Scotts Run	0.10	0.10	0.10	0.10	0.09
08-Dead Run	0.10	0.11	0.10	0.10	0.09
09-Turkey Run	0.10	0.10	0.10	0.09	0.09
10-Pimmit Run	0.10	0.10	0.10	0.10	0.09
11-Four Mile Run	0.10	0.10	0.11	0.10	0.10
12-Cameron Run	0.11	0.10	0.10	0.09	0.09
14-Little Hunting Ck	0.12	0.16	0.18	0.13	0.13
15-Douge Creek	0.11	0.11	0.12	0.10	0.10
16-Accotink Creek	0.10	0.10	0.11	0.10	0.10
17-Pohick Creek	0.10	0.11	0.10	0.09	0.09
20-Mill Branch	0.14	0.12	0.11	0.09	0.09
22-Sandy Run	0.10	0.10	0.10	0.09	0.09
24-Wolf Run	0.10	0.10	0.10	0.09	0.09
25-0ld mill Branch	0.12	0.10	0.10	0.10	0.09
26-Popes Head Creek	0.10	0.10	0.11	0.09	0.09
27-Johnny Moore Ck	0.11	0.10	0.13	0.10	0.09
28-Little Rocky Run	0.10	0.10	0.10	0.10	0.09
29-Cub Run	0.11	0.10	0.11	0.10	0.10
30-Bull Run	0.10	0.10	0.11	0.09	0.09

Table 10
Stream Water Sample Temperature Ranges
(Degrees in Fahrenheit)

Five Year Survey From 1998 To 2002

Temperature Averages (Geometric Mean)

	1998	1999	2000	2001	2002
January	43	38	37	36	42
February	46	41	42	44	40
March	48	45	51	45	47
April	57	55	56	56	60
May	66	62	65	62	61
June	71	70	68	69	71
July	72	73	71	71	75
August	75	74	71	73	75
September	71	64	63	65	68
October	60	55	54	56	61
November	50	48	46	49	47
December	45	42	36	44	38

High & Low Temperature

		1998	1999	2000	2001	2002
January	High	59	59	46	45	58
	Low	34	32	32	32	33
February	High	60	60	59	56	48
	Low	38	34	32	36	28
March	High	72	65	63	55	65
	Low	34	35	43	43	35
April	High	66	68	64	68	77
	Low	49	34	49	45	48
May	High	80	73	77	67	75
	Low	55	48	55	56	44
June	High	81	83	78	83	84
	Low	59	61	59	57	60
July	High	84	83	80	83	86
	Low	64	63	64	62	67
August	High	84	82	80	84	82
	Low	65	62	62	64	66
September	High	83	76	73	77	79
	Low	61	47	59	54	56
October	High	67	64	65	68	79
	Low	51	41	48	45	51
November	High	62	62	56	65	53
	Low	42	38	38	38	41
December	High	60	58	43	56	48
	Low	32	35	32	32	33

TABLE 11

LAKE ACCOTINK PARK

01/01/2002 TO 12/31/2002

PERCENTAGE OF FECAL COLIFORMS

Station #	Total # Samples	<200 mg/l	200 - 1000 mg/l	>1000
LA-01	7	0	86	14
LA-02	7	14	29	57
LA-03	7	0	100	0
LA-04	6	17	83	0

Station #	Average Nitrate Nitrogen	Average pH	Average Total Phosphorus
LA-01	0.2	7.2	0.1
LA-02	0.3	7.2	0.1
LA-03	0.4	7.1	0.1
LA-04	0.5	7.3	0.1

STATION #	Average Dissolved Oxygen	Dissolved Oxygen % Less Than 4 mg/l
LA-01	5.8	40
LA-02	6.7	0
LA-03	5.2	25
LA-04	8.2	0

TABLE 12

CITY OF FAIRFAX STREAM SAMPLE RESULTS

FOR EACH SAMPLING STATION

REPORT FROM 01/01/2002 TO: 12/31/2002

SAMPLE STATION	TOTAL SAMPLES COLLECTED	NUMBER OF FECAL COLIFORM SAMPLES <200 per 100 ml	200-1000 per 100 ml	>1000 per 100 ml
16-20	19	0	16	3
16-21	21	3	12	6
16-22	21	3	12	6
16-23	21	2	15	4
16-24	20	2	5	3
16-25	21	2	12	7
16-26	21	5	11	5
16-27	21	0	17	4

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4 mg/l
16-20	20	7.0	15.0
16-21	22	6.2	36.4
16-22	22	9.0	4.5
16-23	22	7.9	9.1
16-24	21	8.4	9.5
16-25	22	8.3	4.5
16-26	22	8.6	4.5
16-27	20	8.3	5.0

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE NITRATE NITROGEN	AVERAGE pH	AVERAGE TOTAL PHOSPHORUS
16-20	20	0.6	7.0	0.1
16-21	22	0.5	6.7	0.2
16-22	22	0.8	6.9	0.1
16-23	22	0.6	7.0	0.1
16-24	21	0.5	7.0	0.1
16-25	22	0.8	7.0	0.1
16-26	22	0.3	7.0	0.1
16-27	20	0.3	7.1	0.1

Table 13
Log Average of Heavy Metals by Watershed
NOTE: PMCL = Primary Maximum Contaminate Level
1989 - 1998

	METAL (PMCL)	RESULTS(mg/1)
01- HORSEPEN CREEK:		
	Arsenic(0.05mg/1)	0.002
	Barium (1.00mg/1)	0.066
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
02- SUGARLAND RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.046
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
03- NICHOL RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.015
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.002
04- POND BRANCH:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.020
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
NOTE: PMCL =Primary Maximum Contaminate Level
1989 - 1998

	METAL (PMCL)	RESULTS(mg/1)
05- DIFFICULT RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.021
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
06- BULLNECK RUN:		
	Arsenic (0.05 mg/1)	0.001
	Barium (1.00 mg/1)	0.014
	Cadmium (0.01mg/1)	Below Detection Limits
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.001
	Silver (0.05mg/1)	Below Detection Limits
07- SCOTTS RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.018
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.001
	Silver (0.05 mg/1)	0.001
08- DEAD RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.017
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
NOTE: PMCL = Primary Maximum Contaminate Level
From 1989 TO 1998

	METAL (PMCL)	RESULTS(mg/1)
09- TURKEY RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.021
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
10- PIMMIT RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.023
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
11- FOUR MILE RUN:		
	Arsenic (0.05mg/1)	Below Detection Limits
	Barium (1.00mg/1)	0.020
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
12- CAMERON RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.035
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

	METAL (PMCL)	RESULTS (mg/1)
14- LITTLE HUNTING:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.035
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
15- DOGUE CREEK:		
	Arsenic (0.05mg/1)	0.002
	Barium (1.00mg/1)	0.031
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	Below Detection Limits
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.001
	Silver (0.05 mg/1)	0.001
16- ACCOTINK CREEK:		
	Arsenic (0.05 mg/1)	0.001
	Barium (1.00 mg/1)	0.020
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
17- POHICK CREEK:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.022
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

	METAL (PMCL)	RESULTS (mg/1)
20- MILL BRANCH:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.043
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.003
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
22- SANDY RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.029
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02 mg/1)	Below Detection Limits
	Selenium (0.01 mg/1)	0.002
	Silver (0.05 mg/1)	0.001
24- WOLF RUN:		
	Arsenic (0.05mg/1)	Below Detection Limits
	Barium (1.00mg/1)	0.018
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05mg/1)	0.001
25- OLD MILL:		
	Arsenic (0.05mg/1)	0.002
	Barium (1.00mg/1)	0.036
	Cadmium (0.01mg/1)	Below Detection Limits
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.002
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.001
	Silver (0.05mg/1)	Below Detection Limits

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

METAL (PMCL)	RESULTS (mg/1)
26- POPES READ:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.019
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.001
27- JOHNNY MOORE RUN:	
Arsenic (0.05 mg/1)	Below Detection Limits
Barium (1.00 mg/1)	0.017
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.001
Mercury (0.02mg/1)	Below Detection Limits
Selenium (0.01mg/1)	0.002
Silver (0.05mg/1)	0.001
28- LITTLE ROCKY RUN:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.033
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.002
Mercury (0.02 mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.001
29- CUB RUN:	
Arsenic (0.05mg/1)	0.001
Barium (1.00mg/1)	0.046
Cadmium (0.01mg/1)	0.001
Chromium (0.05mg/1)	0.001
Lead (0.05mg/1)	0.002
Mercury (0.02mg/1)	Below Detection Limits
Selenium (0.01 mg/1)	0.002
Silver (0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1998
NOTE: PMCL = Primary Maximum Contaminate Level

	METAL (PMCL)	RESULTS (mg/1)
30- BULL RUN:		
	Arsenic (0.05mg/1)	0.001
	Barium (1.00mg/1)	0.027
	Cadmium (0.01mg/1)	0.001
	Chromium (0.05mg/1)	0.001
	Lead (0.05mg/1)	0.001
	Mercury (0.02mg/1)	Below Detection Limits
	Selenium (0.01mg/1)	0.002
	Silver (0.05 mg/1)	0.001